

## Claims

### What is claimed is:

1. A casting sand heating apparatus, comprising a furnace body, sand inlet, smoke discharge and dust removing port, hearth and sand outlet, wherein the sand inlet is arranged at the top of the furnace body, combustion mouth is arranged in the lower part of the furnace body, in addition, a multi-layer heat exchange apparatus is arranged in the middle part of the furnace body.
2. The casting sand heating apparatus of claim 1, wherein the height of the furnace body is bigger than the horizontal size thereof.
3. The casting sand heating apparatus of claim 1 or claim 2, wherein a sand inlet guidance apparatus is installed on the said sand inlet.
4. The casting sand heating apparatus of claim 1 or claim 2, wherein the heat exchange apparatus is of crisscrossly arranged grid type structure which is comprised of multi-layer casting refractory material.
5. The casting sand heating apparatus of claim 4, wherein the dust removing duct is connected to the smoke discharge and dust removing port, cold air duct is installed on the dust removing duct.
6. The casting sand heating apparatus of claim 5, wherein a smoke return duct is installed at the outside wall of the furnace body, one end of the duct is connected to the dust removing duct, the other end is connected to the upper side of the combustion mouth on the wall of the furnace, a smoke circulating power apparatus is installed in the smoke return duct.
7. The casting sand heating apparatus of claim 6, wherein a check door is arranged on the lower part or at the bottom of the furnace body.
8. The casting sand heating apparatus of claim 6, wherein the thermocouples are arranged at the points of the furnace body or sand outlet and smoke discharge duct, the signal of the thermocouples is transmitted into the computer control system.
9. The casting sand heating apparatus of claim 8, wherein pressure sensors are arranged in the dust removing duct, the signal of the pressure sensors is transmitted into the computer control system.

10. The casting sand heating apparatus of claim 9, wherein the wall of the furnace body is comprised of steel plate, insulation and fire bricks which is the inner side thereof.